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TITLE: PRODUCTION OF GRANULAR FERTILIZER

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ABSTRACT:

PURPOSE: To produce a granular fertilizer with enhanced productivity without requiring equipments such as a heating equipment, etc., which shows only small reduction in its cyanamide content at the time of storing it and can provide a field crop with useful components by its only one application and further, can reduce the interparticle segregation of the effective components of the fertilizer even at the time of using a mixed fertilizer contg. plural effective components to enable the uniform fertilizer application to the crop.

CONSTITUTION: Calcium cyanamide alone or a mixed fertilizer consisting of calcium cyanamide and at least one fertilizer selected from

fused magnesium  
phosphate fused phosphate, ammonium phosphate and potassium  
salts is granulated  
by using urea. At that time, the temp. of a feed  
fertilizer mixture consisting  
of the above calcium cyanamide alone or mixed fertilizer  
and urea or another  
feed fertilizer mixture obtained by further adding an  
organic fertilizer to the  
former feed fertilizer mixture is raised so that the urea  
is brought into a  
molten state by the frictional heat generated in the  
granulating machine  
without performing any external heating to combine the urea  
and the other  
fertilizer components of the feed fertilizer mixture.  
Thereafter, the feed  
fertilizer mixture is granulated.

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(54) 【発明の名称】 粒状肥料の製造方法

(57) 【要約】

【目的】貯蔵中におけるシアナミド成分の低下が少なく、また農作物に有用な成分を一回の散布によって付与することができ、しかも複数の肥効成分を含む配合肥料であってもその粒子間における肥効成分の偏析を少なくして均一な施肥が可能となる粒状肥料を、加熱等の設備を必要とすることなく生産性を高めて製造すること。

【構成】石灰窒素単独又はこれと熔成リン肥、焼成リン肥、リン酸アンモニウム及びカリ塩から選ばれた一種又は二種以上との配合物を尿素を用いて粒状化するにあたり、上記石灰窒素単独又は配合物と尿素からなる原料混合物、又はこの原料混合物に更に有機質肥料を含ませてなる原料混合物を外部加熱を行うことなく成形機の摩擦熱によって尿素的溶融状態まで高めてそれらを結合させた後粒状化することを特徴とする粒状肥料の製造方法。

## 【特許請求の範囲】

【請求項1】 石灰窒素単独又はこれと熔成リン肥、焼成リン肥、リン酸アンモニウム及びカリ塩から選ばれた一種又は二種以上との配合物を尿素を用いて粒状化するにあたり、上記石灰窒素単独又は配合物と尿素からなる原料混合物を外部加熱を行うことなく成形機の摩擦熱によって尿素的溶融状態まで高めてそれらを結合させた後粒状化することを特徴とする粒状肥料の製造方法。

【請求項2】 原料混合物が更に有機質肥料の含まれたものであることを特徴とする請求項1記載の粒状肥料の製造方法。

## 【発明の詳細な説明】

【0001】

【産業上の利用分野】本発明は、石灰窒素又はそれを主成分とする粒状肥料の製造方法に関する。

【0002】

【従来の技術】石灰窒素又はこれに他の肥効成分の配合されてなる配合肥料としては粉状品が一般的であるが、一部には肥効成分の各粒状物を混合してなる粒状タイプのブレンド品も市販されている。粉状品には、散布時の飛散による肥料損失、付近の他の作物への被害、環境汚染等の問題がある。これに対して、粒状タイプのブレンド品にはこれらの問題はないが、肥効成分の偏析等の問題があり、一回の散布によって必要な成分を均一に農作物に与えることが困難であった。

【0003】この問題を解決するため、石灰窒素を水等で予備処理した後造粒することが知られているが（特開昭52-150280号公報）、水添加によって20～30％程度のシアナミド成分が低下する問題がある。一方、石灰窒素又はそれを主成分とする配合物を120～140℃に加熱した後、尿素を添加して溶融分散させ、それを加熱下に造粒することの提案もある（特公昭47-13085号公報）。この方法によれば、水添加法による上記問題はなくなるが、加熱設備が必要となり、しかも石灰窒素又はそれを主成分とする配合物の伝熱効率が悪いので、設備が大型化し生産効率が悪くなるという問題がある。

【0004】

【発明が解決しようとする課題】本発明は、上記問題点を解決し、貯蔵中におけるシアナミド成分の低下が少なく、また農作物に有用な成分を一回の散布によって均一に付与することができ、しかも複数の肥効成分を含む配合肥料であってもその粒子間における肥効成分の偏析を少なくして均一な施肥が可能となる粒状肥料を、加熱等の設備を必要とすることなく生産性を高めて製造することを目的とするものである。

【0005】

【課題を解決するための手段】すなわち、本発明は、石灰窒素単独又はこれと熔成リン肥、焼成リン肥、リン酸アンモニウム及びカリ塩から選ばれた一種又は二種以上

との配合物を尿素を用いて粒状化するにあたり、上記石灰窒素単独又は配合物と尿素からなる原料混合物、又はこの原料混合物に更に有機質肥料を含ませてなる原料混合物を外部加熱を行うことなく成形機の摩擦熱によって尿素的溶融状態まで高めてそれらを結合させた後粒状化することを特徴とする粒状肥料の製造方法である。

【0006】以下、更に詳しく本発明について説明すると、本発明で使用される原料混合物は、石灰窒素と尿素的混合物、熔成リン肥、焼成リン肥、リン酸アンモニウム及びカリ塩から選ばれた一種又は二種以上（以下、これらを総称して「熔成リン肥等」という）と石灰窒素と尿素的混合物、及びこれらの混合物に更に油粕、米ぬか等の有機質肥料を含ませた混合物である。熔成リン肥等を配合する場合は、石灰窒素と熔成リン肥等の合計に対して80重量％以下程度とするのが好ましい。

【0007】尿素的割合は、原料混合物中に5～30重量％含まれる割合が好ましく、5重量％未満では得られた粒子の強度が充分でなくなり、また30重量％をこえると流動性が極端に高まり成形性が悪化する。

【0008】有機質肥料は、石灰窒素単独又は石灰窒素と熔成リン肥等からなる配合肥料を尿素を用いて粒状化するに際し、その粒状化効率を高めるために用いられるものであって、その割合は原料混合物中に20重量％以下特に5～15重量％とするのが好ましい。有機質肥料は、粒状化効率を高めると共に肥効成分、土壌改良剤としても作用する。

【0009】本発明においては、原料混合物は、外部から加熱をすることなく摩擦熱によって尿素的溶融状態すなわち100～140℃程度まで温度を高めることができる成形機で混合され粒状化される。本発明で使用される成形機は、加圧と成形を同時に行うことができるものが好ましく、それを例示すると、スクリュウ型・回転多孔ダイス・回転ブレード等の押出成形機、圧縮ロール・ブリケットングロール・打錠等の圧縮成形機である。

【0010】粒状化の程度としては、0.5～10mmの粒度が望ましく、また形状については円柱状、粒状、顆粒状等であり制約はない。これらの調整は、成形操作の繰返し回数によって行うことができる。

【0011】

【実施例】以下、実施例をあげて更に具体的に本発明を説明する。

【0012】実施例1

石灰窒素（T-N24.5％、Cy-N23.6％）900kgと尿素100kgからなる原料混合物を円形ダイス上を回転するローラーにより加圧成形される押出成形機（富士パウダル社製「ディスクペレタイザーF-5型」）により、外部加熱をすることなく原料混合物がダイスを通過する際に生じる摩擦熱によって温度100℃程度までに高め、溶融状態を形成させつつダイスより押

し出しする操作を繰り返し行い、3×10mmのペレットに成形した。

【0013】原料混合物を押出成形機に投入してから所定時間経過後に3×10mmの粒度にペレット化された割合を製品収率として測定した。また、20分経過後にペレット化された製品の分析及び木屋式硬度測定機による製品硬度を測定し、n=4の平均値を算出した。更には得られたペレットをポリエチレン製袋（厚み0.18mm）に20kg入れて倉庫で保管した際における0.1mm下品の発生率を測定した。それらの結果を表1～表3に示す。

#### 【0014】実施例2

原料混合物として、石灰窒素283kg、熔成リン肥350kg、塩化カリウム167kg及び尿素200kg\*

\*からなるものを用いたこと以外は、実施例1と同様にしてペレット化した。

#### 【0015】実施例3

原料混合物として、石灰窒素817kg、尿素100kg及び油粕83kgからなるものを用いたこと以外は、実施例1と同様にしてペレット化した。

#### 【0016】実施例4

原料混合物として、石灰窒素283kg、熔成リン肥350kg、塩化カリウム167kg、尿素100kg及び米ぬか100kgからなるものを用いたこと以外は、実施例1と同様にしてペレット化した。

#### 【0017】

#### 【表1】

		製品収率 (%)				
		5分後	10分後	20分後	30分後	60分後
実施例	1	35.2	57.7	87.5	98.2	98.7
	2	42.3	64.3	92.1	97.6	99.0
	3	97.5	98.0	98.5	98.5	98.7
	4	95.0	97.2	98.0	98.0	98.0

【0018】

#### ※ ※【表2】

		製品成分 (%)				製品硬度 (kg)
		T-N	Cy-N	W-k <sub>2</sub> O	C-P <sub>2</sub> O <sub>5</sub>	
実施例	1	13.20	9.04	10.10	7.09	5.227
	2	15.70	6.90	10.02	7.09	6.745
	3	13.22	6.97	10.10	7.09	4.227
	4	11.45	6.76	10.22	7.03	5.438

【0019】

#### ★ ★【表3】

		0.1mm下品の割合 (%)					
		スタート	1ヶ月	8ヶ月	12ヶ月	16ヶ月	24ヶ月
実施例	1	0.0	0.1	0.1	0.1	0.2	0.3
	2	0.0	0.1	0.1	0.1	0.2	0.3
	3	0.0	0.1	0.1	0.1	0.1	0.1
	4	0.0	0.1	0.1	0.1	0.2	0.3

【0020】

【発明の効果】本発明によれば、貯蔵中におけるシアナミド成分の低下が少なく、また農作物に有用な成分を一

☆効成分を含む配合肥料であってもその粒子間における効成分の偏析を少なくして均一な施肥が可能となる粒状肥料を、加熱等の設備を必要とすることなく生産性を高めて製造することができる。

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(21)Application number : **05-302888**(71)Applicant : **DENKI KAGAKU KOGYO KK**(22)Date of filing : **02.12.1993**(72)Inventor : **YAMAMOTO TAKAHIRO**  
**ISOGAI ICHIRO****(54) PRODUCTION OF GRANULAR FERTILIZER**

(57)Abstract:

**PURPOSE:** To produce a granular fertilizer with enhanced productivity without requiring equipments such as a heating equipment, etc., which shows only small reduction in its cyanamide content at the time of storing it and can provide a field crop with useful components by its only one application and further, can reduce the interparticle segregation of the effective components of the fertilizer even at the time of using a mixed fertilizer contg. plural effective components to enable the uniform fertilizer application to the crop.

**CONSTITUTION:** Calcium cyanamide alone or a mixed fertilizer consisting of calcium cyanamide and at least one fertilizer selected from fused magnesium phosphate fused phosphate, ammonium phosphate and potassium salts is granulated by using urea. At that time, the temp. of a feed fertilizer mixture consisting of the above calcium cyanamide alone or mixed fertilizer and urea or another feed fertilizer mixture obtained by further adding an organic fertilizer to the former feed fertilizer mixture is raised so that the urea is brought into a molten state by the frictional heat generated in the granulating machine without performing any external heating to combine the urea and the other fertilizer components of the feed fertilizer mixture. Thereafter, the feed fertilizer mixture is granulated.

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CLAIMS

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[Claim(s)]

[Claim 1] lime nitrogen -- independent, a kind chosen from this, \*\*\*\* phosphorus \*\*, a calcined phosphate, ammonium phosphate, and the potash salt, or two sorts or more of compounds -- a urea -- using -- granulating -- hitting -- the above-mentioned lime nitrogen -- independent or the manufacture method of the granular structure characterized by the thing for which the frictional heat of a making machine raised the raw material mixture which consists of a compound and a urea to the melting state of a urea, without performing heat tracing, and they were combined, and which back-granulate

[Claim 2] The manufacture method of a granular structure according to claim 1 that raw material mixture is characterized by containing manure further.

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application] this invention relates to the manufacture method of the granular structure which makes lime nitrogen or it a principal component.

[0002]

[Description of the Prior Art] Although a floury product is common as a mixed fertilizer with which it comes to blend other effect-of-fertilizer components with lime nitrogen or this, the granular type blend article which comes to mix each granular object of an effect-of-fertilizer component is also marketed by the part. There are problems, such as fertilizer loss by scattering at the time of spraying, damage to other neighboring crops, and environmental pollution, in a floury product. On the other hand, although these problems were not in the granular type blend article, it was difficult for there to be problems, such as a segregation of an effect-of-fertilizer component, and to give a required component uniformly to agricultural products by one spraying.

[0003] Although coming after carrying out preliminary processing of the lime nitrogen with water etc. is known in order to solve this problem (JP,52-150280,A), there is a problem to which about 20 - 30% of cyanamide component falls by water addition. On the other hand, after heating the compound which makes lime nitrogen or it a principal component at 120-140 degrees C, a urea is added, melting distribution is carried out and there is also a proposal of coming it under heating (JP,47-13085,B). Although the above-mentioned problem by hydrogenation addition is lost, since the heat transfer efficiency of the compound which a heating facility is needed and moreover makes lime nitrogen or it a principal component is bad according to this method, a facility is enlarged and there is a problem that productive efficiency becomes bad.

[0004]

[Problem(s) to be Solved by the Invention] this invention aims at raising productivity and manufacturing the granular structure whose uniform dressing solves the above-mentioned trouble, the fall of the cyanamide component under storage can give a component useful to agricultural products uniformly by one spraying few, lessens the segregation of the effect-of-fertilizer component between the particle even if it is the mixed fertilizer which moreover contains two or more effect-of-fertilizer components, and is attained, without needing a facility of heating etc.

[0005]

[Means for Solving the Problem] this invention Namely, a lime nitrogen independent or this and \*\*\*\* phosphorus \*\*, a calcined phosphate, In granulating a kind chosen from ammonium phosphate and the potash salt, or two sorts or more of compounds using a urea The raw material mixture which consists of the above-mentioned lime nitrogen independent or a compound, and a urea, Or it is the manufacture method of the granular structure characterized by the thing for which the frictional heat of a making machine raised the raw material mixture which makes it come further to contain manure in this raw material mixture to the melting state of a urea, without performing heat tracing, and they were combined, and which back-granulate.

[0006] Hereafter, the raw material mixture which will be used by this invention if this invention is explained in more detail is the mixture of the kind or two sorts or more ("henceforth \*\*\*\* phosphorus \*\* etc."), lime nitrogen, and urea which were chosen from the mixture of lime nitrogen and a urea, \*\*\*\* phosphorus \*\*, a calcined phosphate, ammonium phosphate, and the potash salt, and the mixture which included manure, such as an oil cake and rice bran, in such mixture further. [ these are named generically and ] When blending \*\*\*\* phosphorus \*\* etc., it is desirable to consider as about 80 or less % of the weight to the sum total of lime nitrogen, \*\*\*\* phosphorus \*\*, etc.

[0007] If the rate of a urea has the desirable rate included five to 30% of the weight in raw material mixture, the intensity of the particle obtained at less than 5 % of the weight becomes less enough and 30 % of the weight is surpassed, a fluidity will increase extremely and a moldability will get worse.

[0008] Manure is faced granulating the mixed fertilizer which consists of a lime nitrogen independent or lime nitrogen, \*\*\*\* phosphorus \*\*, etc. using a urea, it is used in order to raise the granulation efficiency, and as for especially the rate, it is desirable to consider as 5 - 15 % of the weight 20 or less % of the weight into raw material mixture. Manure acts also as an effect-of-fertilizer component and a soil conditioner while raising granulation efficiency.

[0009] In this invention, granulation of the raw material mixture is mixed and carried out by frictional heat with the making machine which can raise temperature to the melting about state of a urea, i.e., 100-140 degrees C, without carrying out heating from the exterior. The making machines used by this invention are compacting machines, such as extruding press machines, such as a SUKURYUU type, a rotation porosity dice, and a rotation blade, and a compression roll briquetting roll, tableting, when

what can perform pressurization and fabrication simultaneously is desirable and illustrates it.

[0010] As a grade of granulation, the grain size of 0.5-10mm is desirable, and has the shape of the shape of a pillar, a grain, and granulation etc. about a configuration, and there are no restrictions. The number of times of a repeat of forming operation can perform these adjustments.

[0011]

[Example] Hereafter, an example is given and this invention is explained still more concretely.

[0012] Frictional heat produced in case raw material mixture passes a dice with the extruding press machine (product made from Fuji PAUDARU "disk pelletizer F-5 type") by which pressing is carried out with the roller turning around a circular dice top in the raw material mixture which consists of 900kg (T-N24.5%, Cy-N23.6%) of example 1 lime nitrogen, and 100kg of ureas, without carrying out heat tracing. It raised by the temperature of about 100 degrees C, and it carried out by having repeated the operation extruded and carried out from a dice, making a melting state form, and fabricated on the 3x10mm pellet.

[0013] After supplying raw material mixture to the extruding press machine, the rate PEPPERRETO-ized by the grain size of 3x10mm after predetermined-time progress was measured as product yield. Moreover, the product degree of hardness by the analysis of a product and a Kiya style determination-of-hardness machine which were pelletized after 20-minute progress was measured, and the average of n= 4 was computed. Furthermore, the incidence rate vulgar 0.1mm at the time of putting 20kg of obtained pellets into polyethylene bag manufacture (thickness of 0.18mm), and keeping it in a warehouse was measured. Those results are shown in Table 1 - 3.

[0014] It pelletized like the example 1 except having used what consists of 283kg of lime nitrogen, 350kg of \*\*\*\* phosphorus \*\*, 167kg of potassium chloride, and 200kg of ureas as example 2 raw-material mixture.

[0015] It pelletized like the example 1 except having used what consists of 817kg of lime nitrogen, 100kg of ureas, and 83kg of oil cakes as example 3 raw-material mixture.

[0016] It pelletized like the example 1 except having used what consists of 283kg of lime nitrogen, 350kg of \*\*\*\* phosphorus \*\*, 167kg of potassium chloride, 100kg of ureas, and 100kg of rice bran as example 4 raw-material mixture.

[0017]

[Table 1]

		製品収率 (%)				
		5分後	10分後	20分後	30分後	60分後
実施例	1	35.2	57.7	87.5	98.2	98.7
	2	42.3	64.3	92.1	97.6	99.0
	3	97.5	98.0	98.5	98.5	98.7
	4	95.0	97.2	98.0	98.0	98.0

[0018]

[Table 2]

		製品成分 (%)				製品硬度 (kg)
		T-N	Cy-N	W-k <sub>2</sub> O	C-P <sub>2</sub> O <sub>5</sub>	
実施例	1	13.20	9.04	10.10	7.09	5.227
	2	15.70	6.90	10.02	7.09	6.745
	3	13.22	6.97	10.10	7.09	4.227
	4	11.45	6.76	10.22	7.03	5.438

[0019]

[Table 3]

		0.1mm下品の割合 (%)					
		スタート	1ヶ月	8ヶ月	12ヶ月	16ヶ月	24ヶ月
実施例	1	0.0	0.1	0.1	0.1	0.2	0.3
	2	0.0	0.1	0.1	0.1	0.2	0.3
	3	0.0	0.1	0.1	0.1	0.1	0.1
	4	0.0	0.1	0.1	0.1	0.2	0.3

[0020]

[Effect of the Invention] Without needing a facility of heating etc., productivity can be raised and the granular structure whose uniform dressing according to this invention the fall of the cyanamide component under storage can give a useful component to agricultural products by one spraying few, lessens the segregation of the effect-of-fertilizer component between the particle even if it is the mixed fertilizer which moreover contains two or more effect-of-fertilizer components, and is attained can be manufactured.

[Translation done.]